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**THE INTERRELATION OF PROFESSIONAL COMPETENCIES
TO DEVELOP STUDENTS' CREATIVITY
AND SCHOOL TEACHERS' DIALECTICAL THINKING¹**

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Abstract. The current stage of society development is characterized by the predominance of the innovation sector of economy, where the most part of activities is implemented with the help of robots and information technologies. The main development factor here is investment in human capital, which generates high competition among specialists who are engaged in personality education and development. This requires new competencies from teachers connected with the development of students' thinking and creativity. The studies related to the connection between teachers' creative thinking and their professional competencies of working with students' creative thinking are highly topical and of practical significance but are not sufficiently represented in scientific literature. The methodological basis of this study is the structural-dialectical approach, where the process of intellectual creativity is operationalized through the actions of dialectical thinking. The "If you think about it..." methodology was used to diagnose the dialectical thinking of teachers. An author's case study methodology was developed to diagnose the professional competencies of teachers. The results of the study include presenting data on the effectiveness of teachers in completing the case tasks aimed at identifying the competencies related to the development of creativity and dialectical thinking of students. A statistically significant correlation has been identified between the level of dialectical thinking of teachers and their professional competencies.

Keywords: dialectical thinking, creativity; school teachers' professional competencies; students

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ВЗАИМОСВЯЗЬ ПРОФЕССИОНАЛЬНЫХ КОМПЕТЕНЦИЙ, НЕОБХОДИМЫХ ДЛЯ РАЗВИТИЯ КРЕАТИВНОСТИ ОБУЧАЮЩИХСЯ И ДИАЛЕКТИЧЕСКОГО МЫШЛЕНИЯ ШКОЛЬНЫХ УЧИТЕЛЕЙ

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Аннотация. Современный этап развития общества характеризуется преобладанием инновационного сектора экономики, где подавляющая часть деятельности реализуется с помощью роботов и информационных технологий. Главным фактором здесь становятся инвестиции в человеческий капитал, что порождает на рынке услуг высокую конкуренцию среди специалистов, занимающихся образованием личности. Это требует от педагогов новых компетенций, связанных с развитием мышления и творчества учащихся. Работы, посвященные взаимосвязи творческого мышления педагогов и их профессиональных компетенций, обладают высокой степенью актуальности и практической значимости, но в научной литературе представлены недостаточно. Методологическим основанием исследования является структурно-диалектический подход, где процесс интеллектуального творчества операционализирован через действия диалектического мышления. Для диагностики диалектического мышления педагогов использовалась методика «А если подумать?». Для диагностики профессиональных компетенций педагогов была разработана авторская кейсовая методика. Представлены данные об успешности выполнения педагогами кейсовых заданий, направленных на выявление компетенций, связанных с развитием творческого мышления учащихся. Установлена статистически значимая взаимосвязь между уровнем диалектического мышления педагогов и их профессиональными компетенциями.

Ключевые слова: диалектическое мышление, креативность; профессиональные компетенции школьных учителей; обучающиеся

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Introduction

The current stage of society development is characterized by the following features: the predominance of the innovative sector of the economy, where the overwhelming part of algorithmized activities is implemented using robots and other engineering and information solutions; reorientation of industry from quantitative growth indicators to qualitative changes in the technologies used, in connection with which scientific developments are becoming the key driving force of the economy — the basis of the knowledge industry; the main factor in the intensification of socio-economic development is investment in human capital, which in turn generates high competition of specialists in the service market, associated both with education and personal development, regardless of age, in particular with the formation of the so-called “21st century skills” (Griffin), that is, such competencies that will ensure a person’s socio-economic and personal success in a rapidly changing world, where the speed of technological change and associated social transformations has long exceeded the limit of the capabilities of the traditional educational cycle (Toffler).

It should be noted that the set of competencies most in demand in the 21st century labor market has undergone significant changes even compared to the second half of the last century (Panorama. Skill needs in Europe. Focus on 2020). A modern highly paid specialist must be able to act with a high degree of productivity both in conditions of lack and in conditions of excess of information; cope with tasks that do not lend themselves to strictly algorithmic solutions; analyze mutually exclusive points of view, and in relation to them, formulate and argue their position; identify and formulate problems, make decisions in a situation of underdetermined tasks and independently set tasks beyond the initially given framework, bring seemingly dead-end situations to a new level of development through unconventional rethinking of various factors that seem unrelated to the initial task (Future work skills – 2020. IFTF).

However, perhaps the key characteristic that leads a person to success today is the ability to generate new original content, that is, the ability to be creative. The essence of competition in the global economy is increasingly in the struggle for who will first bring the most high-tech innovative product to the market, and the current level of technology development implies that the emergence of such products with a high probability changes the nature and quality of familiar ways and types of human activity. Accordingly, the most sought-after, regardless of the industry, are specialists who can provide breakthrough solutions of this level.

It has to be noted that the school, in turn, cannot but respond to the above socio-economic changes. The adoption of the National School Standards in the first decade of the 21st century, based on the methodology of the system-activity approach, is one of the most significant events in the recent history of the Russian

education. The basic principles laid down in these documents are also the basis for the regulatory documents of recent times, including the Federal Educational Program, where the concept of meta-educational results, which are most related to the thinking and communication of students, is still enshrined. Moreover, in the latest documents, universal educational actions are described for all levels of education for each school subject.

However, many years of practice in implementing the National School Standards indicate that the transition to a new quality is painful and fraught with the risk of formalization. As a rule, the reasons lie in: a) the lack of understanding of the substantive essence of innovations by the professional pedagogical community; b) the lack of mastery of technologies that would allow organizing the educational process in such a way as to stimulate independent educational goal-setting and educational cooperation; c) the widespread practice of outdated forms of assessing the success of students; d) the rejection of the new functionality of the subject teacher, when she must, in addition to communicating a certain set of information to students, also be responsible for the formation of a rather extensive set of ways to organize cognitive activity.

Indeed, if we look at the list of requirements for educational results described in the National School Standards, it becomes clear that the zone of professional responsibility of the subject teacher has significantly expanded and requires a completely different professional training. It is necessary not only to teach children logarithms and spelling rules, but: to form a scientific type of thinking, the ability to independently determine the goals of their learning, to make a conscious choice, to find a common solution and resolve conflicts based on the coordination of positions and taking into account interests, to compare experimental and theoretical knowledge with objective life realities, to develop design-research and creative activities of students and more. This kind of requirements for educational performance actually mean that the teacher's activity should be aimed at developing the thinking of students on the material of the academic subject, and this is a very complex process, which involves a completely special organization of the educational process.

From our point of view, the search for a solution to the above problems is the main challenge of modern education. The key difficulty, in our opinion, is that the development of creative thinking of students can only be done by a teacher who has it developed and who regularly practices it herself. The mechanical reproduction of "creativity development techniques" described in any instructions will not give the expected result. The creative approach of the teacher to her work, hobbies, life in general is an important component of working with the creative thinking of students.

Thus, works devoted to the relationship between the creative thinking of teachers and their professional competencies in working with the creative thinking of students in different educational situations have a high degree of relevance and practical significance.

Methodological foundations

Speaking about the general scientific relevance and novelty of the work, it should be emphasized that at the moment the crisis of research on creativity, described at the end of the 20th century by both foreign and Russian authors (Sternberg, & Grigorenko, 1997; Sternberg, & Lubart, 1996; Arlin, 2011) cannot be considered fully overcome. So, Sternberg points to the marginalization of the very problem of creative thinking in the general context of the development of psychological science and explains this, first of all, by the deficit of a theoretical model, the methodological potential of which would allow developing a new generation of diagnostic tools, as well as formulating effective approaches to the formation of transforming human abilities at different stages of age development, including mental mechanisms of productive transformation of uncertainty situations. Many Russian and foreign scientists believe that dialectical thinking is a concept with sufficient heuristic and methodological potential to solve the above-mentioned problems (Basseches, 2005; Belolutsкая, 2017a; Cheng, 2009; Kaya, & Cikis, 2017; Krashennnikov et al., 2013; Paletz et al., 2018; Rigel, 1973; Yang, 2010; Liu, Wang, & Yang, 2015).

The methodological basis of this work is the structural-dialectical approach, set forth in the works by Nikolai Veraksa and students of his scientific school, where the process of intellectual creativity is operationalized through the actions of dialectical thinking, such as “mediation”, “transformation”, “change of alternative”, “dialectical serialization”, “transformation” and others (Belolutsкая, 2015; Belolutsкая, 2017b; Belolutsкая, 2023; Shiyan et al., 2021; Veraksa, 2010; Veraksa et al., 2013).

Within the framework of the structural-dialectical approach, dialectical thinking is considered creative, productive. The concepts of “creative” and “productive” within this concept are synonyms. The creation of new content occurs through the transformation of the contradiction that forms the structure of the problem situation. Only dialectical logic can work with contradiction, since the basis of formal logic, as is known, is the law of non-contradiction. Formal logic is the logic of establishing already existing patterns. Dialectical logic is the logic of generating new possibilities. The heuristic potential of contradiction is realized through dialectical transformations — dialectical mental actions.

In this study, the structural-dialectical approach formed the basis for the development of diagnostic techniques designed to investigate both the level of dialectical thinking of teachers and their mastery of competencies that allow creating conditions for the development of students’ creativity.

Goal and description of methods

The purpose of the study: to verify the relationship between the level of dialectical thinking of teachers and such teacher competencies as:

- Ability to compose tasks that stimulate the creation of original independent works;
- Ability to formulate problem questions;
- Ability to arrange an educational situation so that the student makes a choice in a situation of uncertainty;
- Ability to use cultural references in such a way as to stimulate the creation of original works by students.

To diagnose the above-described skills, an author's methodology consisting of four cases united by a common plot was developed.

To diagnose the dialectical thinking of teachers, the methodology "If you think about it..." (author: E. E. Krasheninnikov), which has not been previously published, was used.

A total of 450 teachers from 44 educational organizations took part in the study.

Description of the case methodology (diagnostics of professional competencies of teachers)

The diagnostics was carried out in the written form. The subjects were presented with a background story, 4 pictures and one question for each picture:

"The class teacher of the 7th grade accompanies the school students on an guided tour to the Pushkin State Museum of Fine Arts. During the visit to the museum, the students visited the exhibition "The Flight to Egypt" by the contemporary Russian artist Irina Zatulovskaya. The exposition is located in the center of the hall in the form of a stepped pyramid made of plywood, on which one can see objects and images of different eras, including modern ones. I. Zatulovskaya's works are often made of atypical, scrap materials — poorly processed boards, old rusty metal sheets, barrel lids, etc. For example, in pic. 1. a plate with a fish's head and tail on a rusty barrel lid is depicted. The children left the hall in bewilderment, they laugh at the exhibits, do not understand why the museum has collected fragments of ancient statuettes and boards, crooked drawings and other strange objects."

Please look at the pictures below and answer the questions on how you would behave in the described situation.

Question 1 — What assignment that develops the ability to create original works can a teacher give to students based on the work with the exhibit shown in the picture?



Fig. 1. Illustration to the first question

Рис. 1. Иллюстрация 1-го вопроса

Question 2 — What assignment that develops the ability to ask problem questions can a teacher give to students based on the work with the exhibit shown in the picture?

Question 3 — What assignment that develops the ability to make choices a teacher can give to students based on the work with the exhibit shown in the picture?

Question 4 — What assignment that develops the ability to see diverse meanings in the works of another person a teacher can give to students based on the work with the exhibit shown in the picture?

“If you think about it...” methodology

The original version of the methodology contains 10 questions. In this study, a shortened version was used.

To complete each of the 5 tasks, one needs to provide one or more examples that match the description given in the task. These can be examples from any area of life: from the simplest, everyday to scientific, philosophical. These tasks were used to assess the main operations of dialectical thinking:

- Transformation;
- Mediation;
- Identification;
- Reversal;
- Retransformation.

Questions:

• There is an object, phenomenon, situation, the meaning and significance of which is known. But if you think about it, their meaning and significance are the opposite of what we thought.



Fig. 2. Illustration to the second question
Рис. 2. Иллюстрация 2-го вопроса



Fig. 3. Illustration to the third question
Рис. 3. Иллюстрация 3-го вопроса



Fig. 4. Illustration to question 4.
The inscription: Volga is the Mother
and Nile is the Father

Рис. 4. Иллюстрация 4-го вопроса.
Волга — матушка, Нил — батюшка

- There are two opposite objects, phenomena, situations that, if they are together, destroy each other. But if you think about it, you can find such a situation or state in which they, being together, not only will not destroy each other, but will also give rise to a new effect.
 - There are two opposite objects, phenomena, situations. But if you think about it, in fact they are the same.
 - There is an object, phenomenon, situation. And there is an opposite object, phenomenon, situation. But if you think about it, you can find another opposite object, phenomenon, situation.
 - There is a phenomenon, situation, process, to understand which you need to trace their changes from beginning to end. But if you think about it, you can go through this path from the end to the beginning, and discover something new and unexpected.

Results

The tables below will show the degree of success in completing the case tasks by teachers. All responses were evaluated on a six-point scale.

Table 1 / Таблица 1

The distribution of respondents' points for answering the question:

“What task, developing the ability to create original works of authorship, can a teacher give students based on working with the exhibit shown in the figure?”

Распределение баллов респондентов при ответе на вопрос:

«Какое задание, развивающее способность создавать оригинальные авторские произведения, может дать учитель ученикам на основе работы с экспонатом, представленным на рисунке?»

№	Points	%	Characteristics of the responses
1	6 points	11	The answer contains a task encouraging / stimulating to express the author's idea and implement it in the product
2	4 points	20	The answer contains a task that assumes that the student will express her idea
3	2 points	23	There is no assignment, a detailed question has been formulated, which can serve as a topic of student discussion, where ideas can be voiced
4	1 points	23	There is no task, the answer is a question to the presented visual material
5	0 points	23	There is no answer

Here are the examples of teachers' contrasting answers to the first question.

Examples of answers that received the maximum score:

- Try to convey the idea of the exhibit by creating your own drawing reflecting the meaning of the painting.

- Imagine that you are a professional art creator. Your task is to create a creative work on the topic: “The beginning and the end.”
- Figure out who could own such a plate. Imagine a portrait of a person (his / her appearance, approximate age, type of activity and attributes of this activity).

The examples of responses that received a minimum score:

- What genre is this exhibit associated with?
- I don't see this as a work of art. I can't ask questions.
- Imagine yourself as a cook of the past

We see that only 11 % of the respondents successfully coped with this case. 69 % (0–2 points) could not formulate such a task.

Table 2 / Таблица 2

**Distribution of respondents' scores for answering the question:
“What task, developing the ability to ask problematic questions,
can a teacher give students based on working with the exhibit shown in the figure?”**

**Распределение баллов респондентов при ответе на вопрос:
«Какое задание, развивающее умение задавать проблемные вопросы,
может дать учитель учащимся на основе работы с экспонатом,
представленным на рисунке?»**

№	Points	%	Characteristics of the responses
1	6 points	5	The answer contains a detailed description of the task to develop students' ability to ask problem questions
2	4 points	10	The answer contains a task involving the development of the ability to formulate problematic questions. The task is formulated very briefly
3	2 points	22	There is no assignment, a detailed question has been formulated, which can serve as a topic of student discussion
4	1 point	34	There is no assignment, the answer is a problem question from the teacher to the presented visual material
5	0 points	29	There is no answer; the task does not develop the ability to ask problematic questions

Here are the examples of teachers' contrasting answers to the second question. Examples of answers that received the maximum score:

- Ask each other questions that cannot be answered unambiguously;
- Ask the author 5 questions that will help you understand the selection of exhibits in this exhibition.

Examples of responses that received a minimum score:

- Why is the job named that way?
- What epochs are depicted here?
- Does this exhibit match its name?

We see that the proportion of respondents who completed the task does not exceed 15 %. 85 % of respondents were unable to formulate the task in such a way

that it provoked students to formulate and ask a problematic question to each other or the teacher.

Table 3 / Таблица 3

**The distribution of respondents' points for answering the question:
“What task, developing the ability to make a choice, can a teacher give
students based on working with the exhibit shown in the figure?”**

**Распределение баллов респондентов при ответе на вопрос:
«Какое задание, развивающее умение делать выбор, может дать учитель
учащимся на основе работы с экспонатом, представленным на рисунке?»**

№	Points	%	Characteristics of the responses
1	6 points	8	The answer contains a task that involves making a reasoned choice
2	4 points	15	The answer contains a task involving a reasoned systematization of options
3	2 points	24	There is no assignment, a question has been formulated that can serve as a topic for discussing motives or selection criteria
4	1 point	24	There is no assignment, the answer is a question to the students, assuming an answer in the form of an utterance with at least 2 possible positions
5	0 points	29	There is no answer; the fixed question does not imply making a choice

Here are the examples of teachers' contrasting answers to the third question.

The examples of answers that received the maximum score:

- Consider the mummified brushes. Think about why it was necessary to make a mummy out of a brush. Decide which personal item you would mummify and why.

- A conversation/discussion using three questions. Reflection of art through the creator's view: What choice/goal did the creator face? (awareness) What might be the consequences of the creator's choice? And the last question is asked personally to the student and his / her opinion, his / her choice: What do I choose?

Examples of responses that received a minimum score:

- What did the author want to say with this exhibit.
- Indicate the functionality of each brush.
- Suppose it is, who did it belong to?

We can see that about 23 % of teachers coped with the task more or less successfully. More than half of the respondents could not offer a task option that encourages students to choose.

Table 4 / Таблица 4

**Distribution of respondents' scores for answers to the question:
 "What task, developing the ability to see various meanings
 in the works of another, can a teacher give students based on work with an exhibit?"**

**Распределение оценок респондентов за ответы на вопрос:
 «Какое задание, развивающее способность видеть различные смыслы
 в произведениях других людей, может дать учитель ученикам
 на основе работы с экспонатом?»**

№	Points	%	Characteristics of the responses
1	6 points	5	The answer contains a task involving the search and interpretation of the author's readings of broad concepts and phenomena
2	4 points	13	The answer contains a task involving the author's interpretation of the exhibit
3	2 points	23	There is no assignment, a detailed question has been formulated that motivates the student to speak about the possible intentions of the artist based on cultural references
4	1 point	36	There is no task, the answer is presented in the form of a question. The question involves making assumptions about the artist's intention
5	0 points	23	There is no answer; the question or task does not develop the ability to see various meanings in the works of another author

Here are the examples of teachers' contrasting answers to the fourth question.

The examples of answers that received the maximum score:

- Draw images that carry several meanings, randomly distribute the drawings (or make a preview) and ask them to find the meaning(s).
- What would the meaning of this work be called by people of different professions?
- Try to write on a small piece of paper what is important to you. What expression or phrase would you leave as a legacy? In what phrase is the deep meaning of the universe hidden in your opinion?

The examples of responses that received a minimum score:

- What name would you give to this work?
- Describe the exhibit.
- To which author does this exhibit belong?

18 % of the respondents coped with this task relatively successfully. About 60 % of respondents could not offer a task option that would imply a variable interpretation of the author's work.

In general, we can conclude that the average success rate of completing tasks is 15–20 % on average in the sample. The greatest difficulty for teachers is the formulation of tasks that would encourage children to create copyrighted products and works of their own design. It turned out to be less difficult to formulate a task

where students have to choose something: a course of action, a subject of reflection, and so on.

As for the “If you think about it...” technique, which diagnoses the level of dialectical thinking in the context of five operations (transformation, mediation, identification, conversion, re-conversion), 57 % of teachers did not cope with these tasks and did not offer a single answer. Only 2 people completed all the tasks, which is less than 1 %. The rest coped with the tasks with varying degrees of success, giving from 1 to 4 correct answers, which is about 42 %.

Here are examples of successful responses when the respondent managed to find a dialectical solution that satisfies the description (for each such response, the respondent was awarded 1 point).

- Transformation action: “The situation of” getting into a bad company or into a good company.” What is hidden behind the definition may be the opposite of the set of features that is implied. So, only the company in which a person is comfortable is good.

- Mediation action: “Water and fire exclude each other, but together they will give a steam engine”.

- Action identification: “Death and birth. In one of Leo Tolstoy’s short stories, the hero feels the process of death the way, presumably, the process of birth is felt: squeezing through a narrow space”.

- Action appeal: “Read a book knowing the ending: follow not the plot, but the way events occur, which leads to the ending”.

- Action reversal: “Let’s turn to nature..... for example, the time of the year is “Spring”. We represent winter as the opposite time of the year, but it can be autumn and summer.”

To verify the statistical significance of the relationship between the level of teachers’ dialectical thinking and their professional competencies in terms of developing students’ creative thinking, the results were processed as follows: for each successful decision in the “If you think about it...” method, the respondent was awarded 1 point, then the points for each respondent were summed up.

In the methodology where teachers solved professional cases, the scores received by the respondent were also summed up for four tasks.

Next, we performed a correlation analysis using the Pearson criterion. The resulting coefficient is: $r_{xy} = 0.34^{**}$ ($** P < 0.01$ at $N = 450$). Thus, the hypothesis of the significance of a positive correlation can be considered proven in this sample of respondents.

Discussion

We consider the results obtained to be important, both from a scientific and practical point of view. It should be taken into account that in the international practice

of assessing the quality of education, including in the framework of the PISA international comparative study, research on the creativity of school students is becoming widespread. Since 2015, students from several dozen countries have been diagnosed with the ability to produce their own ideas and evaluate others'. The analysis of the results does not give much reason for optimism: modern schools still tend to suppress creativity rather than support or develop it. This is primarily due to the fact that most of the tasks faced by school students are of a reproductive nature, imply one correct answer, and discussions, which are a nutritious "broth" for generating ideas, are not given much time. In addition, on the one hand, the analytical, but narrowly utilitarian attitude to art, no matter classical or modern, prevails in the professional consciousness of teachers. Works of literature, painting or architecture are described, facts related to them are memorized and, at best, analyzed from the point of view of art criticism — as a set of artistic techniques. Whereas, in order to develop the ability to create author's works, it is necessary to create such learning situations when other people's works are used as a source of inspiration for their own. Unfortunately, this is extremely rare in wide educational practice.

In fact, the teaching competencies that we have chosen as key ones model the consistent process of working on a creative product. Firstly, the comprehension of ambiguous symbolic content from different perspectives. We deliberately built the methodology on cases that involve working with ambiguous strange artifacts. It is important that the object does not have the usual way of using it "sewn up", which could limit the respondent to some kind of stereotypical set of actions. Secondly, the author's original idea is always born as an answer to a problematic question. Problematization allows us to present the observed object or phenomenon as a contradiction, through overcoming the tension of which a new solution appears. Thirdly, the most important condition for the disclosure of a person's creative potential is the variability of the environment and the possibility of free selection of the subject and the method of activity. Variability and openness are most "nutritious" characteristics of the environment, as they remove the block in the form of fear of error. Whereas any reproductive tasks with the correct answer, on the contrary, form an attitude towards error as something that must be avoided at all costs, but in turn this blocks samples, namely they lead to the development of new ways of activity and the generation of original ideas and products.

It is important to emphasize that all these problems in mass education cannot be solved even if all or most of the teachers are enrolled in the "techniques for creativity development" program. As a rule, this does not lead to anything other than formalization and a meaningless search of options. It is necessary to develop a special way of thinking that will allow the teacher to see the potential of any practical material for working with the creative thinking of students. Dialectical thinking allows any object, phenomenon or situation to be mentally placed in the space of possible transformations at the intersection of different contexts. A good command of the principles and operations of dialectical thinking allows the teacher,

on the one hand, to be an example of a creative attitude to her work, and, on the other, to come up with tasks for students herself, without relying on external tasks or instructions. From our point of view, it is the development of dialectical thinking that is the cognitive basis that, with motivation, will allow the teacher to provide a variable open learning environment where the student will be able to see non-obvious connections, combine contexts, formulate contradictions and generate new author's content.

Conclusion

In this work, for the first time, using the previously unpublished methodology "If you think about it..." (author: E. E. Krasheninnikov) and the case-based methodology of professional diagnostics developed by us, the hypothesis of the relationship between the dialectical thinking of teachers and their level of proficiency in such professional competencies as the ability to compose tasks that stimulate the creation of author's independent works; the ability to formulate problematic issues; the ability to arrange the learning situation so that the student makes a choice in a situation of uncertainty; the ability to use cultural references in such a way as to stimulate the creation of students' copyrighted works.

The obtained results of the correlation analysis give us a reason to assume that dialectical thinking is a necessary condition for a teacher to independently create learning conditions to reveal the creative potential of students, however, in more detail the features of this relationship should be studied within the framework of a formative experiment.

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